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**PROVISIONAL APPLICATION FOR PATENT COVER SHEET**

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

19587 U.S. PTO  
60/550252

INVENTOR(S)					
Given Name (first and middle (if any))		Family Name or Surname		Residence (City and either State or Foreign Country)	
Benjamin		Murphy		Lake Forest, CA, USA	
<input type="checkbox"/> Additional inventors are being named on the ____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (280 characters max)					
MODULAR STORAGE SYSTEM, COMPONENTS THEREFOR, STORAGE METHOD & KIT					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input checked="" type="checkbox"/> Customer Number <span style="border: 1px solid black; padding: 0 20px;">21905</span> →					
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ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification Number of Pages <span style="border: 1px solid black; padding: 0 20px;">40</span>		<input type="checkbox"/> CD(s), Number <span style="border: 1px solid black; padding: 0 20px;"></span>			
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<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76					
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.					
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input checked="" type="checkbox"/> No.					
<input type="checkbox"/> Yes, the name of the U.S. Government agency and the Government contract number are: _____					

Respectfully submitted,

SIGNATURE

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Date 3 / 3 / 04

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(If appropriate)

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24,157

9483

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FOR A PROVISIONAL APPLICATION UNDER CFR 1.53(c)

APPLICANT : Benjamin Murphy  
TITLE : MODULAR STORAGE SYSTEM,  
COMPONENTS THEREFOR, STORAGE  
METHOD & KIT  
DOCKET NO : 9483  
CUSTOMER NO : 21905

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Date:

Mar. 3, 2004

1           MODULAR STORAGE SYSTEM, COMPONENTS THEREFOR,  
2                           STORAGE METHOD & KIT

3  
4                           INCORPORATION BY REFERENCE

5  
6           The inventor incorporates herein by reference any and all U. S.  
7 patents, U. S. patent applications, and other documents cited or  
8 referred to in this application or cited or referred to in the U. S. patents  
9 and U. S. patent applications incorporated herein by reference.

10  
11                           DEFINITIONS

12  
13           The words "comprising," "having," "containing," and "including,"  
14 and other forms thereof, are intended to be equivalent in meaning and  
15 be open ended in that an item or items following any one of these  
16 words is not meant to be an exhaustive listing of such item or items, or  
17 meant to be limited to only the listed item or items.

18  
19                           BACKGROUND OF INVENTION

20  
21           In many situations merchandise or other items displayed or  
22 stored in a modular storage system that upon assembly creates parallel  
23 rows of horizontal shelving commonly found in retail stores and other  
24 venues. Typical modular storage systems are sold by Kitchen Craft,  
25 Streater, California Cabinets, and Darling Fixtures. Such a system may  
26 be a wall unit with horizontal shelving only on one side so that an  
27 opposed side may be pushed against a wall. Or the system may be a  
28 row unit with horizontal shelving projecting from both sides so that a  
29 number of the row units are spaced apart next to each other to create

1 parallel rows of shelving. Both units are commonly referred to as a  
2 "gondola." The base of a conventional gondola is a standard length,  
3 typically either 3 or 4 feet, and a standard width typically either 18 or  
4 22 inches.

5 The horizontal shelves are supported by brackets detachably  
6 connected to vertical uprights. In many cases these vertical uprights  
7 are attached to a generally horizontal base that rests on the floor of,  
8 for example, a retail store. In many instances this base has to be  
9 leveled with shims pushed into place between the bottom of the base  
10 and a non-level floor. Peg-boards are in some instances connected  
11 between the vertical uprights to provide point of sale sites and rigidity  
12 to the gondola. There are holes in the peg-boards positioned on a grid  
13 with a hole measured at its center every inch and the holes aligned in  
14 both vertical and horizontal directions. Attachments for displaying  
15 merchandise or other items are inserted into these holes to connect  
16 them to the peg-boards. These attachments may be easily detached and  
17 repositioned as desired.

18 The vertical uprights are commonly elongated hollow metal  
19 structures with a rectangular cross-section and have along an outer  
20 face a series of indexing sites positioned in a row in an equally spaced  
21 apart sequence at a standard spacing of 1 inch on centers. Typically  
22 these indexing sites are openings in the face of the vertical upright into  
23 which fit snugly hook-shaped connectors extending from a rear edge of  
24 a bracket for a shelf. When the hook-shaped connectors are inserted  
25 into the sites, the bracket extends outward generally at a right angle to  
26 the face of the vertical upright. A pair of horizontally aligned brackets  
27 connected to adjacent vertical uprights support a shelf. In addition to  
28 the brackets and shelves, other components of the system may be used  
29 such as, for example, baskets, peg-board attachments, hangers, etc. The

vertical uprights have a standard height of about 78 to about 86 inches.

It would be highly desirable from a sales perspective to create cabinets that would be compatible with the modular systems currently in use. Such cabinets could be used to display merchandise in a more appealing manner and create an image of higher quality merchandise that commands a higher price. A problem in making cabinets is "racking." A conventional cabinet has a top panel, a bottom panel, a pair of side panels having their respective top and bottom edges fastened to the top and bottom panels, and a fifth component such a back panel or diagonal back brace. The fifth element prevents racking. Such a fifth anti-racking element is, however, incompatible with the modular storage systems commonly in use in retail stores. Currently, a cabinet is custom made and then attached to a conventional gondola.

#### SUMMARY OF INVENTION

This invention, with its several desirable features, is summarized in the CLAIMS that follow. After reading the following section entitled "DETAILED DESCRIPTION OF SOME EMBODIMENTS OF THIS INVENTION," one skilled in the art will understand the benefits this invention provides. These benefits include, but are not limited to: (a) providing cabinets that are modular and compatible with modular storage systems commonly in use in retail stores or other venues, (b) cabinets or shelving that is a non-standard length to enable more efficient use of the storage space available, (c) components that are easy to manufacture and are compatible with modular storage systems commonly in use in retail stores or other venues, (d) panels detachably connected to gondola wall and row units that facilitate constructing a

cabinet without the need for a fifth anti-racking element, (e) shelf clip members that are of identical shape and that may be conveniently used at different locations on a panel by simply inverting, (f) a rail member that may be detachably connected between conventional vertical uprights to support a vertically oriented panel, (g) a panel clip member for detachably connecting a panel to wall and row units, and (h) other components compatible with the modular storage systems commonly in use in retail stores or other venues.

#### DESCRIPTION OF DRAWING

Some embodiments of this invention, illustrating all its features, will now be discussed in detail. These embodiments depict the novel and non-obvious modular storage system, components therefor, kit, and method of this invention as shown in the accompanying drawing, which is for illustrative purposes only. This drawing includes the following figures (Figs.), with like numerals indicating like parts:

Fig. 1 is a schematic illustration of the racking problem experienced by conventional cabinets requiring a fifth element to prevent racking.

Fig. 2 illustrates a wall section with a cut-a-way portion exposing a stud.

Fig. 3 is a wall unit used with the modular storage system of this invention.

Fig. 4 is a perspective view of a pair of brackets detachably connected to a rail member of this invention holding a shelf shown in phantom lines.

Fig. 4A is a perspective view of a shelf bracket for supporting a



shelf that may be connected to a rail member of this invention.

Fig. 4B is a perspective view of a basket bracket for supporting a basket that may be connected to a rail member of this invention.

Fig. 5 is a partially assembled cabinet in the modular storage system of this invention showing the side panels connected to a rail member mounted between a pair of adjacent vertical uprights of the wall unit shown in Fig. 3.

Fig. 6 depicts the top and bottom panels added to the partially assembled cabinet illustrated in Fig. 5.

Fig. 7 is an enlarged, fragmentary perspective view taken along line 7 of Fig. 5.

Fig. 8 is similar to Fig. 2 showing a horizontal support member fixedly attached between wall studs.

Fig. 9 is one embodiment of a completely assembled modular storage system of this invention.

Fig. 10 is another embodiment of a completely assembled modular storage system of this invention.

Fig. 11 is still another embodiment of a completely assembled modular storage system of this invention.

Fig. 11A is another embodiment of the modular storage system of this invention shown as disassembled.

Fig. 12 is a perspective view showing a rail member of this invention being detachably connected to adjacent vertical uprights of a conventional gondola.

Fig. 13 is a cross-sectional view taken along line 13-13 of Fig. 12.

Fig. 14 is a perspective view, with sections broken away, of a left hand end panel of this invention.

Fig. 15 is a perspective view, with sections broken away, of a divider panel of this invention.

1 Fig. 16 is a perspective view, with sections broken away, of the  
2 divider panel shown in Fig. 16 being rigidly and detachably connected  
3 to the rail member shown in Fig. 12.

4 Fig. 16A is a perspective view, with sections broken away, of a  
5 long divider panel being rigidly and detachably connected by a pair of  
6 divider panel clips each clip connected to one of a pair of adjacent  
7 horizontal rail members.

8 Fig. 17 is a perspective view of one embodiment of a divider  
9 panel clip of this invention.

10 Fig. 17A is a perspective view of another embodiment of a divider  
11 panel clip of this invention.

12 Fig. 17B is a perspective view of another embodiment of a divider  
13 panel clip of this invention.

14 Fig. 18 is a perspective view of one embodiment of a right hand  
15 end panel clip of this invention.

16 Fig. 18A is a perspective view of another embodiment of a right  
17 hand end panel clip of this invention.

18 Fig. 18B is a perspective view of one embodiment of a left hand  
19 end panel clip of this invention.

20 Fig. 19 is a perspective view, with sections broken away, of a right  
21 hand panel being attached by a right hand end panel clip to the rail  
22 member shown in Fig. 12.

23 Fig. 20 is a perspective view, with sections broken away, of a shelf  
24 of this invention being detachably connected to the right hand panel  
25 shown in Fig. 19.

26 Fig. 21 is a fragmentary perspective view of a shelf of this  
27 invention.

28 Fig. 22 is a top plan view of one embodiment of the shelf clip of  
29 this invention.

1 Fig. 23 is a rear perspective view of the shelf clip shown in Fig.

2 22.

3 Fig. 24 is a front perspective view of the shelf clip shown in Fig.

4 22.

5 Fig. 25 is a cross-sectional view taken along line 25-25 of Fig. 20.

6 Fig. 26 is a perspective view, with sections broken away, of a shelf  
7 attachment device of this invention.

8 Fig. 27 is a cross-sectional view taken along line 27-27 of Fig. 26.

9 Fig. 27A is an enlarged, fragmentary cross-sectional view taken  
10 along line 27A of Fig. 27.

11 Fig. 27B is an enlarged, fragmentary side view of a section of a  
12 corner edge of the shelf attachment devices shown in Fig. 27.

13 Fig. 28 is a cross-sectional view taken along line 28-28 of Fig. 27.

14 Fig. 29 is a perspective view, with sections broken away, of a pair  
15 of shelf attachment devices shown in Fig. 27 detachably connected to a  
16 pair of adjacent horizontal supports.

17 Fig. 30 is a perspective view of the shelf manager attachment of  
18 this invention including an intermediate connector mounted to a  
19 horizontal support.

20 Fig. 31 is a perspective view of a shelf that is used with the shelf  
21 manager attachment shown in Fig. 30.

22 Fig. 31A is a fragmentary side view of the shelf shown in Fig. 31  
23 attached to one support of the shelf manager attachment shown in Fig.  
24 30.

25  
26 DETAILED DESCRIPTION OF SOME EMBODIMENTS OF THIS INVENTION

27  
Figs. 9, 10, 11 and 11A illustrate different embodiments of the  
modular storage system of this invention, namely, the system 10 (Fig.

9), the system 12 (Fig. 10), the system 14 (Fig. 11), and system 15 (Fig. 11A). In all these systems 10, 12, 14, and 15 at least some of system's components are connected directly or indirectly along vertical and horizontal directions, for example, using a conventional gondola 16 depicted in Fig. 3, which is a wall unit. Alternately, as depicted in Figs. 2 and 8, at least some of system's components may be mounted to a wall 19 directly. In this later case, one type of a horizontal support may comprises at least a pair of adjacent horizontal boards 17a and 17b having their respective opposed ends 17a nailed, screwed or otherwise fixed between adjacent studs 23 (only one shown) of the wall 19. Each horizontal board 17a and 17b is slightly set off about 1/2 inch away from the wall 19 by a strip of plywood 21 to form a recess 21a. As will be apparently subsequently, the recess enables the appropriate panel clips (Figs. 17, 17A, 17B, 18, 18A and 18B) of this invention to be used to connect rigidly an appropriate panel (Figs. 14, 15, and 19) of this invention in a vertical orientation.

The system 10 includes a cabinet 18, shelving 20, a cubbyhole 22, scope bins 124, and gravity feed bins 126. The cabinet 18 avoids the racking problem without an anti-racking fifth element 36. The racking problem is illustrated in Fig. 1. A conventional cabinet is simply a box B with opposed parallel panels: a top panel 28, a bottom panel 30, a left hand end panel 32, and a right hand end panel 34. As shown in Fig. 1 (C), without a back panel, or other type of rear fifth element 36, "racking" or sideways movement will occur when a lateral force as indicated by the arrow A is applied to the box B. In this invention, racking is avoided by rigidly attaching to a horizontal support a vertical panel such as the left hand (Fig. 20) and right hand (Fig. 20) end panels 32 and 34 designed in accordance with this invention. This horizontal support may be a rail member 38 (Fig. 12)

of this invention, or, as shown in Figs. 2 and 8, a pair of adjacent horizontal boards 17 (Fig. 8) nailed, or otherwise fixedly attached between adjacent wall studs 23. The advantage of using the rail member 38 is that it may be detachably connected to the vertical uprights of a conventional gondola 16 (Fig. 3).

In assembling the cabinet 18 in accordance with this invention at least one pair of panels are employed, for example, the right hand end panel 32 and the left hand end panel 34 (Figs. 5 and 11A), or one of these end panels and a divider panel 40 (Figs. 15 and 16). The appropriate two panels are selected on the basis of the type of shelving and/or cabinet structure being assembled. The selected two panels are spaced apart and detachably and rigidly connected to the support structure, either the horizontal rail member 38 or the horizontal board 17. As discussed subsequently in greater detail, the connection of the two panels to the horizontal support is accomplished using one or more appropriate panel clips of this invention, namely, a divider panel clip 42 or 42a (Figs. 17 and 17A), a left hand end panel clip 44 or 44a (Figs. 19 and 18B), and a right hand end panel clip 46 or 46a (Figs. 18 and 18A). As subsequently discussed in detail, the assembly of a panel clip, panel, and horizontal support provide a rigid cantilever structure.

The rail member 38 of this invention as illustrated best in Figs. 12 and 13 includes an elongated body 38b having opposed ends 33a and 33b. The body 38b has a generally C-shape cross-section as depicted in Fig. 13 with a central section 38c and a pair of opposed L-shaped legs 38d and 38e. This C-shape cross-section increases the rigidity and strength of the rail member 38. The length of the rail member 38 may vary and be customized for a specific situation or it may come in standard 3 or 4-foot lengths for use with standard vertical uprights of conventional gondolas. The width  $w_1$  of the central section

38c may be important in some cases, for the wider the central section the greater its strength and the greater its surface area to assist in holding a panel rigidly in place to avoid racking.

Each opposed end 33a and 33b has thereat a connector element 35 adapted to interact with a vertical upright 37a or 37b, as the case may be, to connect detachably the rail member 38 between these vertical uprights. Each vertical upright 37a and 37b is a hollow tubular structure made of steel and having a rectangular cross-section. On a face F of each vertical upright 37a and 37b is a series of indexing sites in a row equally spaced apart a standard distance such as 1 inch from their centers. In this embodiment, the sites comprise rectangular shaped openings 39, typically having a length of 7/8 inch and spaced apart a distance of about 3/8 inch.

Each connector element 35 comprises a pair of prongs 35a and 35b substantially at a right angle with respect to the central section 38c of the body 38b. The prongs 35a and 35b of each pair are spaced apart a predetermined distance greater than the length of one indexing site, that is, the vertical length of an individual openings 39. In other words, one or more indexing sites are situated between the adjacent prongs 35a and 35b upon insertion of the individual prongs of each connector element 35 into a pair of openings 39 when connecting the rail member 38 between the vertical uprights 37a and 37b. Thus, each pair of prongs 35a and 35b is detachably connected to a pair of sites separated by at least one indexing site. In the embodiment illustrated, the prongs 35a and 35b are substantially flat and spaced apart a predetermined distance of about 1 inch from their centers. The rail member 38 may be made from a sheet of material that is cut and bent to form the shape of the rail member. For example, 14 gauge cold rolled steel may be used.

Fig. 16 shows the divider panel 40 being detachably connected to one of the horizontal rail members 38 by the divider panel clip 40. This clip 40 has a rear segment in the form of hook-shaped element 48 that fits snugly over a top edge 38a of the rail member 38 and a forward segment in the form of spaced apart parallel arms 50a and 50b that provide a panel connector element. The arms 50a and 50b are equal in length, each having a length from about 1 to about 2 inches. The outer edges 51a and 51b respectively of the arms 50a and 50b turn inward towards each other to form opposed fingers 51c and 51d that are at an acute angle that is greater than about 5° and less than 90°, with respect to their respective arms 50a and 50b. A tab 52 with a central aperture 54 extends outward from the edge 51a of the arm 50a. The aperture 54 is sized to receive a pin 56. This pin 56 has, as shown in Fig. 15, an outer portion 56a and an inner portion 56b. Fig. 17A depicts an alternate embodiment of the panel clip of this invention, the panel clip 42, which instead of using a tab with an aperture has a pair of parallel slots 58 in each of the arms 50a and 50b. Fig. 17B depicts another alternate embodiment of the panel clip of this invention, the panel clip 42a, which instead of using a tab with an aperture has pairs of holes 58a and 58b in each of the arms 50a and 50b.

Both the panel clips 42 and 42a may be made from a sheet of material, for example 14 gauge cold rolled steel. The metal sheet material is cut and bent to form either panel clips 42 and 42a. When made from metal sheet material, the hook-shaped element 48 includes: (a) a substantially top planar section 60, (b) an outer substantially planar section 62 integral with an outer end 60a of the top planar section and at substantially a right angle to this top section, and (c) an inner substantially planar section 64 integral with an inner end 60b of the top planar section and at substantially a right angle to the top

planar section. The top planar section 60 has a width from about 1/2 to about 1 1/2 inch and a length from about 1/4 to about 1 inch and is substantially equal to the width of the edge 38a of the rail member 38. The outer and inner planar sections 62 and 64 each have a width substantially equal to the width of the top section.

The arms 50a and 50b are outwardly extending, planar, and each is integral with an edge of the hook element's inner planar section 64 and at substantially a right angle to this inner planar section. The arms 50a and 50b form an open mouth M with the fingers 51c and 51d forming spaced apart lips having planar surfaces 66. An inside lateral edge 68 of a divider panel 40 is interactive with the arms 50a and 50b. One or more divider panel clips 42 are manually slid along this lateral edge 68 with each arm 50a and 50b engaging one of the flat opposite sides 41a (Fig. 16) and 41b (Fig. 15) of the divider panel 40. As illustrated in Fig. 16, when the aperture 56 in the tab 52 of a divider panel clip 42 is in registration with a selected opening 72 in a side 41a or 41b of the divider panel 40, a pin 56 is inserted through the aperture 56. The pin 56 has its outer portion 56a engaging the tab 52 in the clip 42 and its inner portion 56b inserted into an opening 72 in a side 41a or 41b of the divider panel 40.

As illustrated in Fig. 16, the divider panel 40 may be held upright in a vertical orientation by a single divider panel clip 42 if this panel is relatively short, for example having a length of about 36 inches or less. But in many modular storage systems of this invention where longer divider panels 40a are employed as shown in Fig. 16A, two divider panel clip 42b and 42c are used to prevent a long divider panel 40a from torquing or twisting. The clip 42b is connected to an upper horizontal orientated rail member 38b and the clip 42c is connected to an adjacent, lower, horizontal orientated rail member 38c.



Consequently, the two panel clips are spaced apart along an inside lateral edge 68 of the long divider panel 40a. The arms 50a and 50b of each of these divider panel clips 42b and 42c orient the panel 40a vertically and hold the panel 40a rigidly so that the panel does not rotate either clockwise or counter-clockwise or pivot to the right or the left towards the rail members 38b and 38c.

The divider panel clips 42, 42b and 42c are each configured to be interactive with both sides 41a and 41b of a divider panel 40 to which it is to be connected. Each side 41a and 41b of the divider panels 40 and 40a is planar and includes a pair of spaced apart longitudinally extending parallel grooves 70a and 70b that are at an acute angle that is greater than about 5° and less than 90°, with respect to the side 41a or 41b, as the case may be. The grooves 70a and 70b point away from each other. The finger 51c and groove 70a are at substantially the same acute angle and the finger 51d and groove 70b are at substantially the same acute angle. Nearby each groove 70a and 70b is a series of substantially longitudinally extending openings 72 in a row R1 or R2. Each row R1 and R2 of openings 72 is substantially parallel to its nearby groove. The rows R1 and R2 are also parallel to each other.

During assembly of one of the embodiments of the modular storage system of this invention, the one or more divider panel clips 42 are detachably connected to the lateral edge 68 of the divider panel 40. A divider panel clip 42 is first placed over or under the divider panel 40 to which it is to be connected with the fingers 51c and 51d aligned with the grooves 70b on the opposed sides 41a and 41b of the divider panel. It is then slid manually along the lateral edge 68 with the fingers 51c and 51d being pushed into and along the grooves 70b. The divider panel clips 42 are hung on the rail members 38 or boards 17 as

discussed above and the vertical location of the divider panel 40 is adjusted until a desired vertical position is attained. Then a pin 56 is inserted through the aperture 54 in the tab 52 of the clip 42. The pin's outer portion 56a engages the tab 52 in the clip 42 in the clip 42a and the pin's inner portion 56b is inserted into an opening 72 in a side 41a or 41b of the divider panel 40, as the case may be. This locks the divider panel 40 in the desired vertical position until disassembled. When a divider panel clip 42a shown in Fig. 17A is used, the pin 56 extends through the slot 58 into the selected opening 72.

Each end panel clip 44 and 46 is configured to be interactive with only one side of a panel and a rear lateral edge thereof to which it is to be connected. As shown in Figs. 18 and 19, the right hand end panel clip 46 has parts that similar in shape to the divider panel clip 42 and it may also be made from sheet material and cut and bent into shape like the divider panel clip. The right hand end panel clip 46 has a hook shaped element 48 as discussed above, one long arm 46a that is essentially identical to the arm 50a of the divider panel clip 42, and one short straight arm 46b, terminating in a straight edge 46c that is at a right angle the top planar section 60 of the hook shaped element. The long arm 46a terminates in the finger 51c and has the tab 52 with the aperture 54 therein for a pin 56.

The right hand end panel 34 has a opposed planar sides with only one side S1 including a pair of spaced apart longitudinally extending parallel grooves, only groove 70b shown, that are at an acute angle that is greater than about 5° and less than 90°, with respect to the side S1. The finger 51c and groove 70b are at substantially the same acute angle. Nearby each groove is a series of substantially longitudinally extending openings 72 in a row R1 (only one row shown). Each row of openings 72 is substantially parallel to its nearby

groove and the rows are also parallel to each other. Along the inner lateral edge 69 of the right hand end panel 34 is a longitudinally extending channel 74 into which the straight edge 46c of the short arm 46b is inserted during assembly. Consequently, upon connecting the right hand end panel 34 to the rail member 38 using the right hand end panel clip 46 and inserting a pin 56 into the aperture 54 and an aligned opening 72, the right hand end panel is held rigid in place and will not rotate or pivot.

The left hand end panel clip 44 as shown in Fig. 19 is a mirror image of the right hand end panel clip 46. This left hand end panel clip 44 connects the rail member 38 or other horizontal support to the left hand end panel 32 (Fig. 14) like that of the right hand end panel clip 46. Its long arm 44a is essentially identical to the arm 50b of the divider panel clip 42 and includes the finger 51d. The left hand end panel clip 44 also has a parallel short arm 44b. The left hand end panel 32 includes in its inside surface 32a the parallel rows R1 and R2 of openings 72 next to the parallel grooves 70a and 70b and its lateral rear edge 69a has a longitudinally extending channel 74 that receives the short arm 44b upon assembly of the left hand end panel clip 44 and the left hand end panel 32.

After the left hand end panel 32 and right hand end panel 34 have been rigidly attached to a horizontal support as depicted in Figs. 5 and 11A, horizontal shelves 76 are detachably connected between these panels using the shelf clips 78 of this invention shown in Figs. 20 through 25. These shelf clips 78 are also used with the divider panel 40. Alternately conventional fixtures may also be used, for example, the panels 32, panel 34, and 40 may use KV™ standards and associated clips. A top panel 28 and a bottom panel 30 may also be detachably connected between the left hand end panel 32 and right hand end

panel 34 as shown in Fig. 6 to form a cabinet 75 without an anti-racking back panel. Fig. 11A illustrates a gondola 16a with shelves 76 on both sides with a peg-board 16b mounted between the vertical uprights. This peg-board 16b does not function as a fifth anti-racking element and is used in the conventional manner to hang items on it. The shelf clips 78 are adapted to connect detachably at selected positions to any vertical panel of this invention by partial insertion into either the groove 70a or 70b and held in position by a pin 56.

Referring to Figs. 22 through 23, each individual shelf clip 78 includes a pair of substantially planar finger elements 78a and 78b that are a substantially identical in configuration. The finger elements 78a and 78b intersect along a line B to form a substantially right angle with respect to each other. The finger element 78a is above the finger element 78b and they are symmetrical. Another substantially planar finger element 78c projects outward from the intersection of the finger elements 78a and 78b to form angles c and d greater than 90° with respect these finger elements 78a and 78b. The angles c and d may be greater than 90° and less than 180°. These angles c and d are chosen so that upon inserting the finger element 78c into, for example the groove 70a as illustrated in Fig. 20, an inner side 79 (Fig. 23) of the finger element 78b bears against and is substantially flush with the inside surface 32a of the panel 32. Because the finger elements 78a and 78b are at a right angle, the finger element 78a is at a right angle to the inside surface 32a upon connection of a shelf clip 78 to a vertical panel of this invention. Each finger element 78a and 78b has a hole 80 therein to be aligned with an opening 72 in a side of the vertical panel. To hold the shelf clip 78 in position, a pin 56 is inserted through the hole 80 and into an aligned opening 72.

As depicted in Fig. 25, each finger element 78a and 78b has an

outer raised tip 81. The finger elements 78a and 78b are positioned relative to each other with their respective tips 81 pointing in opposite directions. The raised tips 81 are each adapted to fit into a drilled cavity 77a or 77b in an underside 76a of a shelf 76 made in accordance with this invention. An edge 78d of the fingers 78a and 78b between the tip 81 and the finger element 78c fits in an elongated portion of the cavity 77a or 77b when connected thereto. The cavities 77a or 77b are both adjacent outer edges E1 (only one shown) of each shelf 76. The cavities 77a and 77b are substantially identical. Each has a cylindrically shaped portion inwardly displaced from an edge of the shelf 76 with an open end in the shelf's underside 76a and an open end 77c along this edge. As illustrated best in Fig. 25, the cavities 77a and 77b are positioned so that upon attachment of a shelf 76 to a vertical panel, the open end 77c of both cavities is aligned with the groove 70a and 70b.

Due to the unique configuration of the shelf clip 78 of this invention, it is simply inverted when it is to be connected to the groove 70b. Thus, the shelf clip 78 may be used with any of the panels of this invention even though the panel may be a divider panel 40, a left hand end panel 32 or a right hand end panel 34. Similar to the other clips of this invention, the shelf clip 78 may be made from a sheet of material that is cut and bent to form the shelf clip, for example 12 gauge cold rolled steel. Consequently, the finger elements 78a, 78b, and 78c are integral with each other. The finger elements 78a and 78b each have a width  $w_2$  from about 1/4 to about 3 inches and a height of less than about 3/4 inch. The finger element 78c has a width usually less than the width  $w_2$  of the finger elements 78a and 78b and a length about twice that of the height of the finger elements 78a and 78b or about 1 1/2 inches. In other words, the finger element 78c has a width

substantially equal to the combined width of the finger elements 78a and 78b.

An optional modular component of this invention is a shelf attachment device 84 shown in Figs. 26 through 29. The shelf attachment device 84 has an elongated body 85 with at least one segment, for example a hook member 86, for detachably connecting the device to a horizontal support such as the rail member 38. There may be a series of these hook members 86 aligned along one side of the body 85. These hook members 86 comprise planar pieces and are very similar in shape to the hook-shaped elements 48 of the of the panel clips discussed above. This enables the hook members 86 to be placed over the top edge 38a of a rail member 38 to mount the shelf attachment device 84 securely, but detachably, to the rail member or other horizontal support.

As best shown in Fig. 27, the body 85 of the shelf attachment device 84 has a substantially U-shaped cross section with a pair of parallel legs 85a and 85b connected by a front segment 85c to form the corner edges 85d and 85e. The outer end of the one leg 85a has a plurality of spaced flanges 89 along this leg at a right angle thereto. There is a hook member 86 at an outer end 89a of each flange 89. The shelf attachment device 84 like the modular clips of this invention as discussed above may be made from a sheet of material that is cut and bent to form the device. Thus, the legs 85a and 85b, front segment 85c, and flange 89 are planar segments at right angles to adjoining parts. As shown in Fig. 28, a reinforcing bar 87 with U-shaped notches 87a along an edge may be used to enhance the strength of the shelf attachment device 84. This bar 87 is spot welded in place on the inside of the front segment 85c.

Along the corner edge 85e is a series of indexing sites positioned

in a row R3 in an equally spaced apart sequence. Usually, through not required, the sites in the row R3 are positioned essentially like the positions of the openings 39 along the vertical upright 37a. The row R3 of the sites comprises essentially identically shaped openings 88 having an L-shaped cross-section with legs 88a and 88b at a right angle with respect to each other. As shown in Figs. 27A and 27B, each opening 88 has a longitudinal length  $l_1$  of about 7/8 inch, and the legs 88a and 88b each have a length  $l_2$  and  $l_3$  respectively of about 3/16 inch. These openings 88 are spaced apart a distance from about 1 inch on their centers. As illustrated in Fig. 27A, when the reinforcing bar 87 is used, its notches 87a are sized and positioned to be aligned with the opening 88 in the corner edge 85e. The corner edge 85e is substantially vertically orientated upon connection of the shelf attachment device 84 to a horizontal support.

As illustrated in Fig. 29, a pair of the shelf attachment devices 84a and 84b is mounted on a pair of adjacent horizontal rail members 38b and 38c. The hook members 86a of the devices 84a and 84b grasp the rail member 38b and the hook members 86b of the devices 84a and 84b grasp the rail member 38c. The shelf attachment devices 84a and 84b are now aligned parallel to each other and are vertically oriented. They are not in a fixed position, however, and may be moved laterally along the rail members 38b and 38c to adjust the distance between them as desired. A pair of conventional brackets 90a and 90b shown in phantom lines may now be attached to each shelf attachment device 84a and 84b by inserting the brackets' respective connector ends 90c and 90d into the L-shaped openings 88 in each device that are in line with each other. A conventional shelf 91 may now be placed on the brackets 90a and 90b.

Fig. 30 illustrates another optional modular component of this

invention: a shelf manager attachment 94 that enables a user to move shelves laterally. This shelf manager attachment 94 is mounted to a horizontal support such as the rail member 38 (shown in phantom lines in Fig. 30) using an intermediate connector 96.

The shelf manager attachment 94 has a latter-like configuration and includes a series of parallel planar supports 98 in a row R4 connected between a pair of L-shaped side plates 100a and 100b. The planar supports 98 are spaced apart usually from about 1/4 to about 2 inches, enabling a viewer to see through the shelf manager attachment 94. Each side plate 100a and 100b has a planar leg 101a and a planar leg 101b at a right angle to each other. The legs 101b are of equal width from about 1/8 to about 1 inch. There are spaced apart holes 102 along the length of each of the legs 101a (holes 102 only shown in one leg 101a), enabling metal screws 102a or other type of fasteners to pass through these holes for connecting the shelf manager attachment 94 to the intermediate connector 96. The opposed ends 98a and 98b of each support 98 are attached to the outer ends of the legs 101b by a narrow section 103. Thus, a gap 104 having a U or J shape is created between the backside of each support 98 and an outer edge 101c of the legs 101b.

The intermediate connector 96 includes a U-shaped planar central body 106 with a central planar element 106a having downwardly pointing, elongated planar legs 106b and 106c when this intermediate connector is mounted on a rail member 38. A pair of outwardly projecting L-shaped members 108a and 108b is attached to the opposed ends of the central planar element 106a. Each L-shaped member 108a and 108b includes a pair of planar arms 108c and 108d at a right angle to each other. The front face 110 of each arm 108d has holes 110a therein that receive the screws 102a upon attaching the



shelf manager attachment 94 to the intermediate connector 96. Upon assembly of the manager attachment 94 and the intermediate connector 96, a structure is formed with one or more hook-type segments for detachably connecting the shelf manager attachment 94 to a horizontal support member such as the rail member 38. The arms 108c are equal in width and approximately equal to the width  $w$  of the top edge 38a of the rail member 38. Consequently, the assembled manager attachment 94 and intermediate connector 96 fits snugly over the rail member 38 to which it is being detachably connected.

The shelf 112 shown in Fig. 31 has a flat, planar top surface 112a and, extending downward at a right angle to the top surface 112a, planar right hand and left hand sides 112b (the right side is not shown) and a front side 112c. Along a rear side 112d is a planar lip 114 offset from the rear side a distance  $d$  approximately equal to the thickness  $t$  of the support 98. This offset lip 114 thus provides a narrow space 116 into which the upper edge 98c of the support 98 is inserted to attach the shelf 112 to the shelf manager attachment 94. This manner of detachably connecting the shelf 112 to the support 98 allows a user to move the shelf laterally to a selected horizontal position as desired. Moreover, the legs 101b, in effect, reduce the shelf space available. This is desirable in situations where the user wishes to reduce the inventory stored on shelves. For example, vitamin bottles are usually small; so many such vitamin bottles are stored on conventional shelves, sometimes for an undesirably long duration. Using the shelf manager attachment 94 of this invention thus reduces inventory.

Like most of the other components of this invention, the shelf manager attachment 94, intermediate connector 96, and shelf 112 may be made by cutting and bending a sheet of material such as 14 gauge

cold rolled steel. All such metal components may be powder coated with plastic particles that are melted and cooled to form a protective film covering the surfaces of the components.

### General

The components of this invention discussed above, including the vertical panels 32, 34, 40, panel clips 42, 44 and 46, shelf clips 78, and shelves 76 of this invention, enable a user to create a modular storage system with one or more custom designed cabinets and shelving depicted in Figs. 9, 10, 11, and 11A. These modular components may be arranged in a countless number of ways to utilize the available space to display and/or store merchandise and/or other items in the most cost effective and efficient manner. The shelves may be adjustable both vertically and laterally. The cabinet 18 may have a non-load bearing backing, one or more doors, a doorframe for the door, one or more drawers, and a drawer front a drawer. A modular storage system of this invention may include one or more face frames, molding, electrical lights, and signs, cubbyholes, and bins. Several types of brackets 118, (Fig. 4), 120 (Fig. 4A), and 122, each a with hook member H1 for attaching these brackets to a horizontal support such as the rail member 38 or the boards 17a or 17b, may be used with modular storage system of this invention. The brackets 118 and 120 are used to support a shelf. The bracket 122 is used to support bins, either a scope bin 124 or a gravity-feed bin 126 (Figs. 9, 10 and 11).

In some cases, especially making a cabinet as a portion of the modular storage system of this invention, it may be desirable to fix the components in position with screws, mechanical couplers, or other fasteners rather than mounting them to be detached. Also,

conventional shelf mounting fixtures and other conventional attachments may be used in conjunction with the vertically panels of this invention.

#### SCOPE OF THE INVENTION

The above presents a description of the best mode contemplated of carrying out the present invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains to make and use this invention. This invention is, however, susceptible to modifications and alternate constructions from that discussed above which are fully equivalent. Consequently, it is not the intention to limit this invention to the particular embodiments disclosed. On the contrary, the intention is to cover all modifications and alternate constructions coming within the spirit and scope of the invention as generally expressed by the following claims, which particularly point out and distinctly claim the subject matter of the invention:

## CLAIMS

1. A modular storage system where at least some of its components are connected directly or indirectly along vertical and horizontal directions to a support structure, said system comprising,

at least one pair of panels, said panels being spaced apart and connected to the support structure by a plurality of panel clip members,

each panel clip member including one segment connected to the support structure and another segment connected to a panel,

each said panel clip members orienting the panel to which it is connected substantially vertically and extending outward from the support structure at substantially a right angle, and

at least one substantially horizontally oriented member extending between the panels.

2. The modular storage system of Claim 1 where the horizontally oriented member is a shelf.

3. The modular storage system of Claim 2 where the shelf is adjustable.

4. The modular storage system of Claim 2 where the shelf is fixed.

5. The modular storage system of Claim 1 where the panel clip members are detachably connected.

6. The modular storage system of Claim 1 including at least one cabinet.

7. The modular storage system of Claim 1 including one at least door.
8. The modular storage system of Claim 7 including a doorframe for the door.
9. The modular storage system of Claim 1 including at least one drawer.
10. The modular storage system of Claim 1 including at least one drawer front.
11. The modular storage system of Claim 1 including at least one face frame.
12. The modular storage system of Claim 1 including molding.
13. The modular storage system of Claim 1 including lighting.
14. The modular storage system of Claim 1 including signage.
15. The modular storage system of Claim 1 including at least one bin.
16. The modular storage system of Claim 1 including at least one cubbyhole.
17. A modular storage system comprising  
at least one pair of spaced apart rail members, each rail member

mounted on a substantially vertically oriented support structure in a substantially horizontal orientation,

at least one pair of panels space apart and detachably connected to the rail members by a plurality of panel clip members,

each panel clip member having a predetermined configuration that orients the panel to which it is connected substantially vertically and to extend from the support structure at substantially a right angle, and

at least one shelf member extending between the pair of panels in a substantially horizontal orientation.

18. A modular storage system comprising

at least one pair of spaced apart rail members, each rail member mounted on a substantially vertically oriented support structure in a substantially horizontal orientation,

at least one pair of panels space apart and mounted substantially vertically to extend from the support structure at substantially a right angle,

said panels being connected to the rail members by a plurality of panel clip members, and

at least one shelf member extending between the pair of panels in a substantially horizontal orientation, said shelf member having opposed ends with one opposed end connected to one panel by a first pair of spaced apart shelf clip members and the other opposed end connected to the other panel by a second pair of spaced apart shelf clip members.

19. The modular storage system of Claim 18 where each shelf clip member is detachable and comprises first and second finger elements

intersecting to form a substantially right angle with respect to each other, the first finger element being above the second finger element and detachably connected to one panel and the second finger element being detachably connected to one opposed end of the shelf member, and a third finger element extending outward at the intersection of the first and second finger elements to form an angle greater than 90° and less than 180° with respect to one of the first and second finger elements, said third finger being detachably connected to said one panel.

20. The modular storage system of Claim 19 where said one panel forms one side of the modular storage system and includes a substantially planar section having opposed sides and opposed lateral edges, only one of said opposed sides having a pair of spaced apart longitudinally extending slots therein with a series of openings nearby each slot in a row extending substantially longitudinally, each said row being substantially parallel to its nearby slot.

21. The modular storage system of Claim 20 where one of the opposed lateral edges has therein a substantially longitudinally extending slot therein into which extends a portion of at least one of the panel clip members.

22. The modular storage system of Claim 18 including a third panel between the pair of panels, said third panel including a substantially planar section having opposed sides, both of said opposed sides having a pair of spaced apart longitudinally extending slots therein with a series of openings nearby each slot in a row extending substantially longitudinally, each said row being substantially parallel to its nearby

slot.

23. The modular storage system of Claim 18 where the shelf member has a cavity on an underside thereof nearby an edge thereof that receives a portion of one shelf clip member upon connection therewith.

24. The modular storage system of Claim 18 where at least one pair of the panel clip members is interactive with only one side of a panel to which it is connected.

25. The modular storage system of Claim 18 where at least one pair of the panel clip members is interactive with both sides of a panel to which it is to be connected.

26. The modular storage system of Claim 18 including a right hand side panel, a left hand side panel, and a center side panel.

27. The modular storage system of Claim 26 including a pair of right hand panel clip members detachably connected to the right hand side panel, pair of left hand panel clip members detachably connected to the left hand side panel, and pair of center panel clip members detachably connected to the center panel.

28. The modular storage system of Claim 18 where each rail member comprises an elongated body member having opposed ends, each opposed end including a connector element interacting with a vertical upright to detachably connect the rail member to the vertical upright.

29. The modular storage system of Claim 28 where the connector



element comprises a pair of prong elements spaced apart a predetermined distance greater than the length of one indexing site of a series of equally spaced apart indexing sites along the vertical upright, enabling the prong elements to be detachably connected to a pair of said sites separated by at least one indexing site.

30. The modular storage system of Claim 29 where the prong elements are substantially at a right angle with respect to the body member of the vertical upright.

31. The modular storage system of Claim 18 including

a shelf attachment device that interacts with a vertical upright including a series of indexing sites positioned in an equally spaced apart sequence,

said shelf attachment device comprising an elongated body with at least one segment detachably connected to at least one of the rail members and configured to orient the shelf attachment device substantially vertically,

said elongated body having an edge including a series indexing sites in a row, each site being in a predetermined position in an equally spaced apart sequence substantially identical to the position of the indexing sites along the vertical upright.

32. The modular storage system of Claim 18 including a shelf manager attachment that is detachably connected to a rail member, said shelf manager attachment including at least one support member adapted to carry a shelf member thereon and allow said shelf member to be moved laterally.

33. The modular storage system of Claim 18 where there are a pair of longitudinal grooves in each vertical panel at an angle with respect to a side of the panel that is greater than about 5° and less than 90°, with each groove in the pair pointing away from each other.

34. The modular storage system of Claim 18 including at least one pair of substantially identical shelf brackets, both brackets of said pair detachably connected to a common rail member to position substantially horizontal a shelf member attached thereto.

35. The modular storage system of Claim 34 where each shelf bracket comprises a pair of planar elements spaced apart a distance substantially equal to the thickness of a shelf member to be attached thereto and said shelf member has an edge disposed between the planar elements.

36. The modular storage system of Claim 18 including at least one shelf bracket having a first segment adapted to be detachably connected one rail member and a second segment adapted to support a shelf member on a top portion thereof.

37. The modular storage system of Claim 18 including at least one shelf bracket having a first segment adapted to be detachably connected to one rail member and a second segment including an upper edge with at least one pair of spaced apart grooves therein that interact with a storage member of the modular storage system.

38. A modular storage system including  
a gondola support having a base and a plurality of uprights in a

row extending from the base at an angle of substantially  $90^\circ$ , said uprights including a series of indexing sites positioned in an equally spaced apart sequence,

a first rail member detachably connected to an adjacent pair of uprights to form a right angle with respect to the uprights, said first rail member having at each opposed ends thereof a connector element that engages one of the indexing sites along the upright to detachably connect the rail member to the upright,

a second rail member spaced from said first rail member and connected to said adjacent pair of uprights to form a right angle with respect to the uprights, said second rail member having at each opposed ends thereof a connector element that engages at least one of the indexing sites along the upright to detachably connect the rail member to the upright,

a first panel detachably connected to the rail members by first and second spaced apart panel clip members, the first clip member having one segment that detachably connects to the first rail member and another segment that engages an inner lateral edge of the first panel, and the second clip member having one segment that detachably connects to the second rail member and another segment that engages an inner lateral edge of the first panel along another portion than the segment of the first clip member,

a second panel spaced apart and nearby the first panel and detachably connected to the rail members by third and fourth spaced apart panel clip members, the third clip member having one segment that detachably connects to the first rail member and another segment that engages an inner lateral edge of the second panel, and the fourth clip member having one segment that detachably connects to the second rail member and another segment that engages an inner lateral

edge of the second panel along another portion than the segment of the third clip member,

said first and second panels being substantially parallel to each other and substantially a right angle to the base, and

at least one support member extending between the first and second panels substantially at a right angle thereto and detachably connected to said panels.

39. A panel clip member adapted to detachably connect to a horizontal orientated rail member a panel in a vertical orientation, said clip member comprising

a first segment adapted to be detachably connected the rail member and a second segment adapted to be detachably connected to the panel,

said second segment including an arm member configured to extend outward from the first segment substantially at a right angle to said rail member upon attaching the first segment to said rail member, said arm having a terminal edge section at an acute angle with respect to the arm member that is adapted to be inserted into a longitudinal slot in the panel.

40. The panel clip member of Claim 39 where the terminal edge section includes at least one aperture through which a pin may be partially inserted to enable one portion of the pin to engage the arm member and another portion of the pin to be inserted into an opening in a side of the panel.

41. The panel clip member of Claim 39 has a predetermined shape enabling it to interact with both right-handed and left-handed panels.

42. The panel clip member of Claim 39 including a pair of spaced apart arm members forming an open mouth with spaced apart lips having planar surfaces, said arms flexing away from each other upon insertion into the open mouth of a lateral edge of the panel and grasping the panel which fits snugly between the arms, said lips orienting the panel vertically when the first segment is connected to the horizontal orientated rail member.

43. The panel clip member of Claim 39 where the first segment comprises a hook element adapted to be placed over an edge portion of the rail member.

44. The panel clip member of Claim 39 configured to be interactive with only one side of a panel to which it is to be connected.

45. The panel clip member of Claim 39 configured to be interactive with both sides of a panel to which it is to be connected.

46. A panel clip member made from a sheet of material that is cut and bent to form said clip member, which comprises

a hook element including (a) a first substantially planar section, (b) a second substantially planar section integral with a first end of the first planar section and at substantially a right angle to said first section, (c) a third substantially planar section integral with a second end of the first planar section and at substantially a right angle to said first section, and

a panel connector element including (a) a first outward extending planar arm integral with one edge of the hook element's third planar

section and at substantially a right angle to said third planar section, said first planar arm having a terminal edge section at an acute angle with respect to the first planar arm, and (b) a second outward extending planar arm integral with another edge of the hook element's third planar section and at substantially a right angle to said third planar section, said second planar arm terminating in a substantially straight edge.

47. The panel clip member of Claim 46 where the sheet material has a thickness from 1/16 to 1/2 inch, the first planar section has a length from 1/4 to 1 inch, and the second and third sections each have a width substantially equal to the width of the first section.

48. The panel clip member of Claim 47 where the first planar arm has a length from 1 to 1 1/2 inch.

49. The panel clip member of Claim 46 where the terminal edge section includes at least one aperture through which a pin may be partially inserted to enable one portion of the pin to engage the arm member and another portion of the pin to be inserted into an opening in a side of the panel.

50. A shelf clip member adapted to detachably connect to a vertically orientated panel, said shelf clip member comprising

first and second finger elements intersecting to form a substantially right angle with respect to each other, the first finger element being above the second finger element,

a third finger element extending outward from the intersection of the first and second finger elements to form an angle greater than 90°

with respect the first and second finger elements,

said third finger element being adapted to be detachably connected to a panel, said first finger element being adapted to be detachably connected to a shelf, and said second finger element being substantially flush with a panel upon said shelf clip member being connected to the panel.

51. The shelf clip member of Claim 50 where the first and second finger elements each have therein a hole adapted to be aligned with an opening in a side of the vertically oriented panel upon connection of the shelf clip member to said one side panel.

52. The shelf clip member of Claim 50 where the finger elements are substantially planar.

53. The shelf clip member of Claim 51 where the finger elements have a substantially identical configuration, each having an outer raised tip adapted to engage an underside of a shelf, said finger elements being positioned relative to each other with their respective tips pointing in opposite directions.

54. A shelf clip member made from a sheet of material that is cut and bent to form said clip member, said shelf clip member comprising

first and second planar finger elements intersecting to form a substantially right angle with respect to each other, the first finger element being integral with and above the second finger element,

said first and second finger elements each (a) having therein a hole adapted to be aligned with an opening in a side of a vertically oriented panel upon connection of the shelf clip member to said one

side of the panel, and (b) each having an outer raised tip adapted to engage an underside of a shelf, said finger elements being positioned relative to each other with their respective tips pointing in opposite directions, and

a third planar finger element extending outward from the intersection of the first and second finger elements to form an angle greater than  $90^\circ$  with respect the first and second finger elements.

55. The shelf clip member of Claim 54 where the sheet material has a thickness from 1/16 to 1/2 inch.

56. The shelf clip member of Claim 55 where the third planar finger element has a width substantially equal to the combined width of the first and second planar finger elements and projects outward from a common edge defining the intersection of the first and second planar finger elements, said third planar finger being integral with said common edge.

57. A rail member comprising

an elongated body member having opposed ends, each opposed end including a connector element adapted to interact with a vertical upright to detachably connect the rail member to the vertical upright,

each connector element comprising a pair of prong elements spaced apart a predetermined distance greater than the length of one indexing site of a series of equally spaced apart indexing sites along the vertical upright, enabling the prong elements to be detachably connected to a pair of said sites separated by at least one indexing site,

said prong elements being substantially at a right angle with respect to the body member.



58. A rail member made from a sheet of material that is cut and bent to form said rail member, said rail member comprising

an elongated planar body member having opposed ends, each opposed end including a planar connector element adapted to interact with a vertical upright to detachably connect the rail member to the vertical upright,

each connector element comprising a pair of substantially flat prong elements spaced apart a predetermined distance of 1 inch from their centers,

said prong elements being substantially at a right angle with respect to the body member.

59. A panel adapted to form one side of a modular storage system comprising

a substantially planar section having opposed sides and opposed edges,

only one of said opposed sides having a pair of spaced apart longitudinally extending grooves therein with a series of substantially longitudinally extending openings in a row nearby each groove, said rows being substantially parallel to its nearby groove and parallel to each other, and

one of the opposed edges has therein a substantially longitudinally extending channel therein that is adapted to interact with a panel clip member

each groove being at an angle with respect to a side of the planar section that is said greater than about 5° and less than 90°, with each groove in the pair pointing away from each other.

60. A panel adapted to form an intermediate divider member of a modular storage system comprising

a substantially planar section having opposed sides and opposed edges,

both said opposed sides each having a pair of spaced apart longitudinally extending grooves therein with a series of substantially longitudinally extending openings in a row nearby each groove, said rows being substantially parallel to its nearby groove and parallel to each other,

each groove being at an angle with respect to a side of the planar section that is said greater than about 5° and less than 90°, with each groove in the pair pointing away from each other.

61. A shelf attachment device that during assembly of a modular storage system is adapted to interact with a vertical upright including a series of indexing sites positioned in a row in an equally spaced apart sequence, said shelf attachment device comprising

an elongated body with at least one segment adapted to be detachably connected to a horizontally mounted rail member,

said elongated body having an edge that is substantially vertically orientated upon connection of the shelf attachment device to a horizontally mounted rail member,

said edge including a series indexing sites positioned in a row in an equally spaced apart sequence substantially identical to the position of the indexing sites along the vertical upright.

62. The shelf attachment device of Claim 61 where the distance between sites is 1 inch on centers.

63. A shelf attachment device made from a sheet of material that is cut and bent to form the shelf attachment device, said shelf attachment device comprising

an elongated body with at least one hook segment for detachably connecting the shelf attachment device to a horizontal support member,

said elongated body having a pair of planar segments at a right angle that form an edge that is substantially vertically orientated upon connection of the shelf attachment device to a horizontal support member,

said edge including a series indexing sites positioned in a row and equally spaced apart a distance 1 inch on centers.

64. A shelf manager attachment that during assembly of a modular storage system is used to support a shelf member, said shelf manager attachment including

a pair of hook segments for detachably connecting the shelf manager attachment to a horizontal support member,

at least one support member adapted to carry a shelf member thereon and allow said shelf member to be moved laterally.

65. The shelf manager attachment of Claim 64 including a series of said support members oriented parallel to each other and spaced apart a predetermined distance.

66. A method of storing items comprising

mounting a pair of spaced apart planar members to one or more horizontal support members with at least one clip member connecting a planar member to a horizontal support member,

each said clip member having a first element that fits snugly over an edge of a horizontal support member and a second portion that fits snugly over an inside edge of the planar member to which said clip member is connected to form a rigid cantilever structure,

mounting between said planar members a horizontal shelf, and storing on the shelf said items.

67. A kit for a modular storage system comprising

a plurality of rail members, each rail member adapted to be mounted on a substantially vertically oriented support structure in a substantially horizontal orientation, and

a plurality of panel clip members, each panel clip member having a first segment adapted to be detachably connected to one rail member mounted to the support structure and a second segment adapted to be detachably connected a panel to mount said panel in a substantially vertical orientation.

Fig. 1

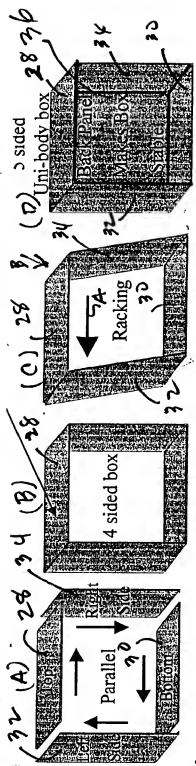


Fig. 3

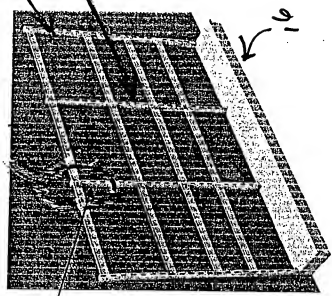


Fig. 2

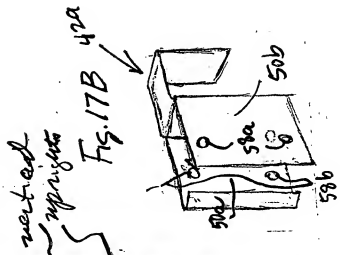
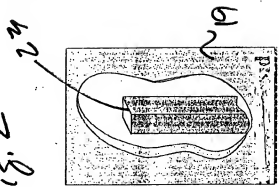


Fig. 4A

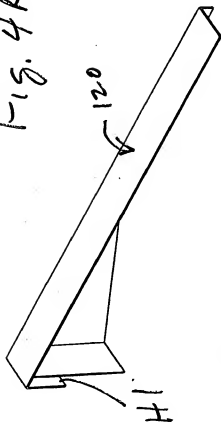


Fig. 4B

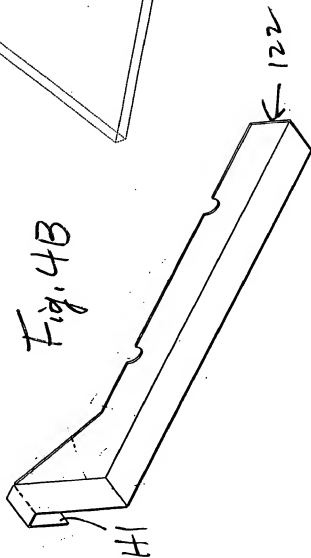
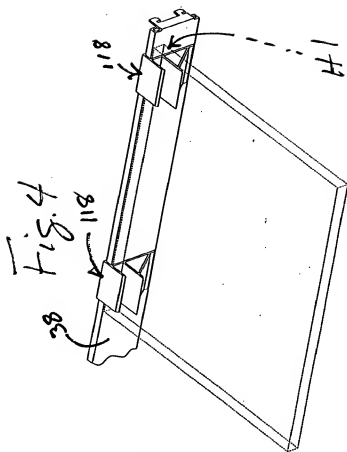
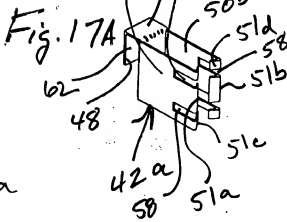
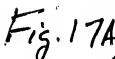
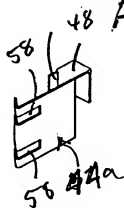
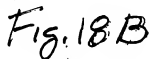
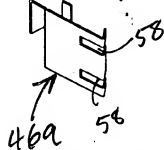
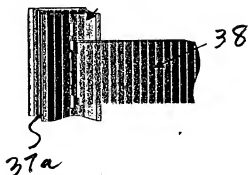
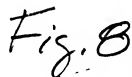
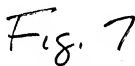
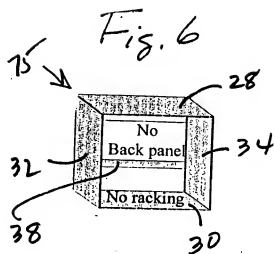
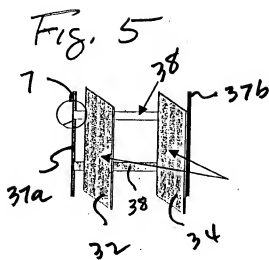
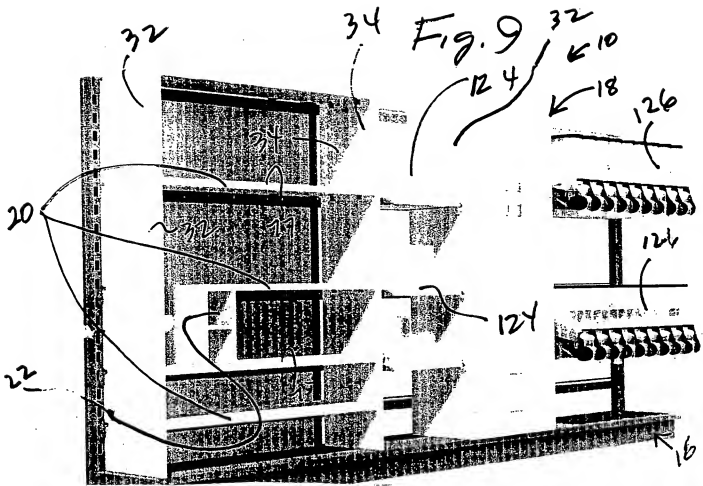


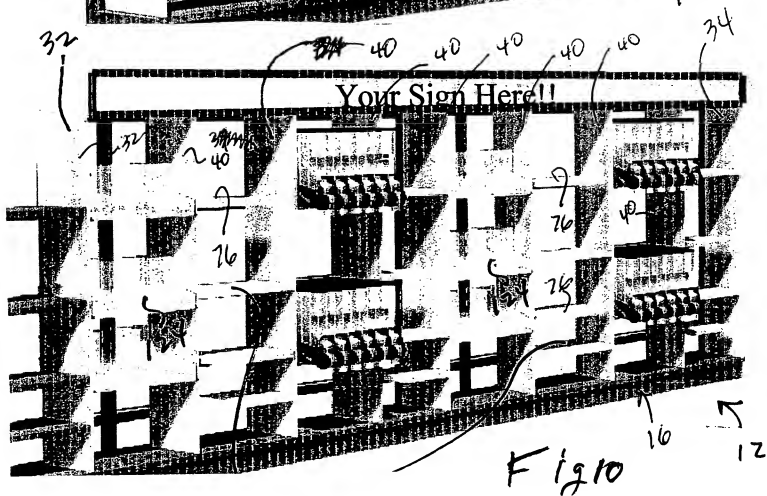
Fig. 4



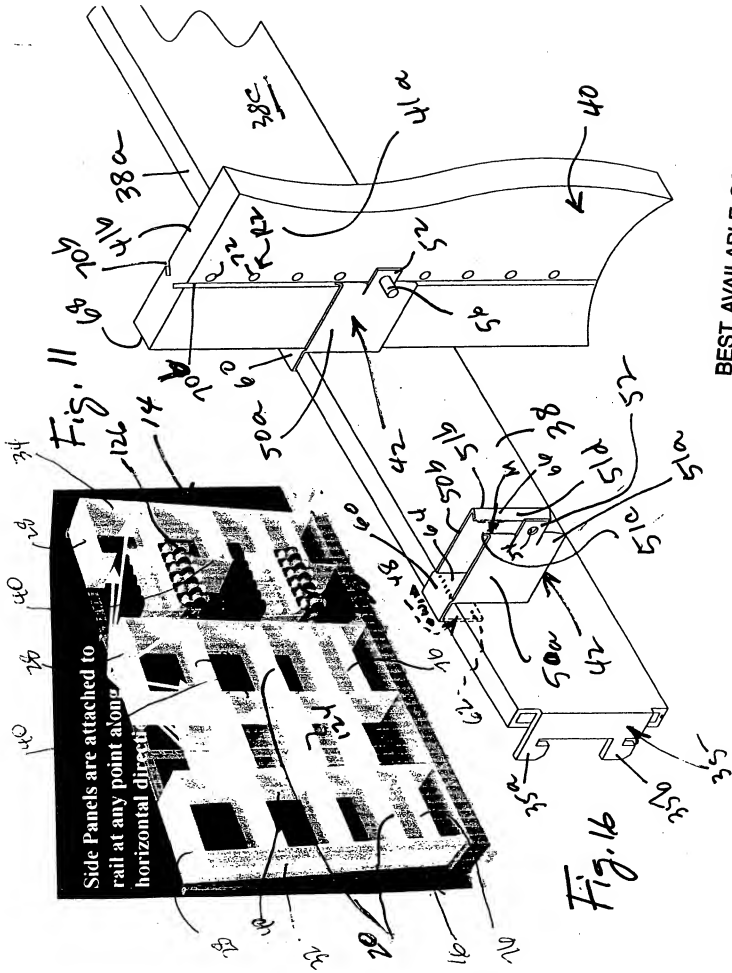


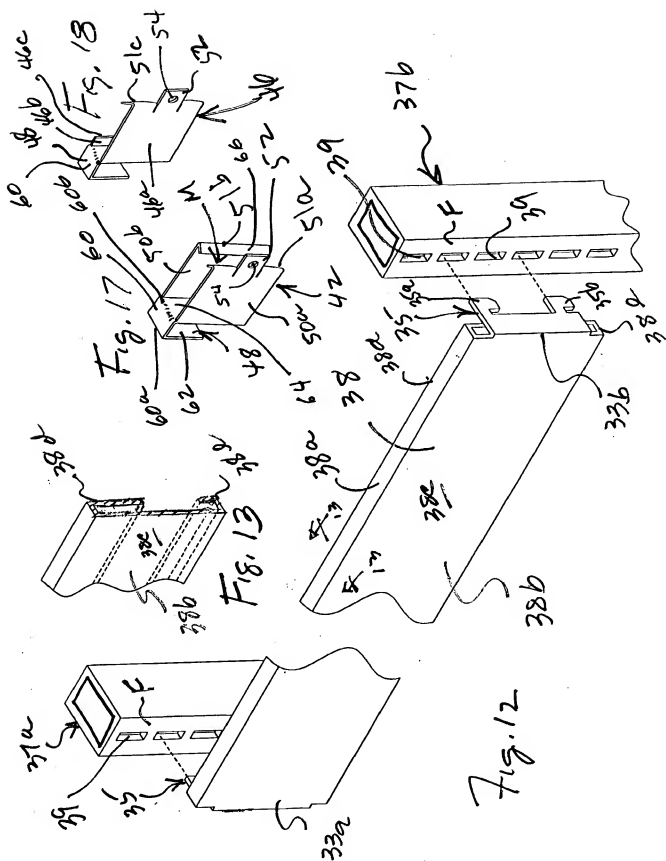


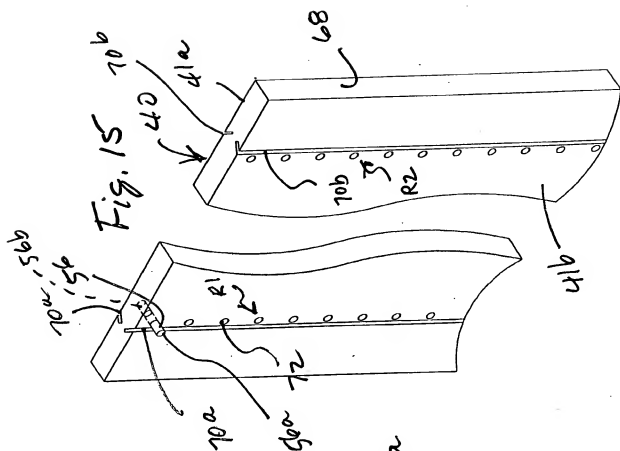
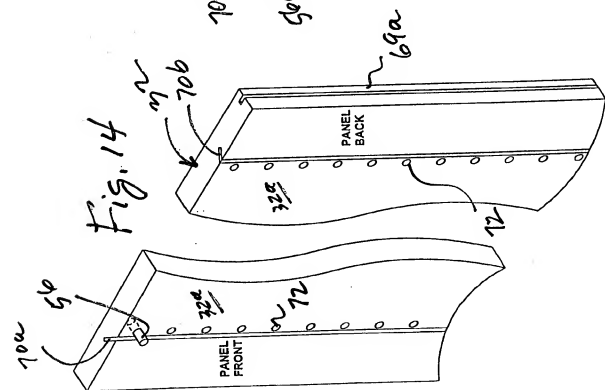
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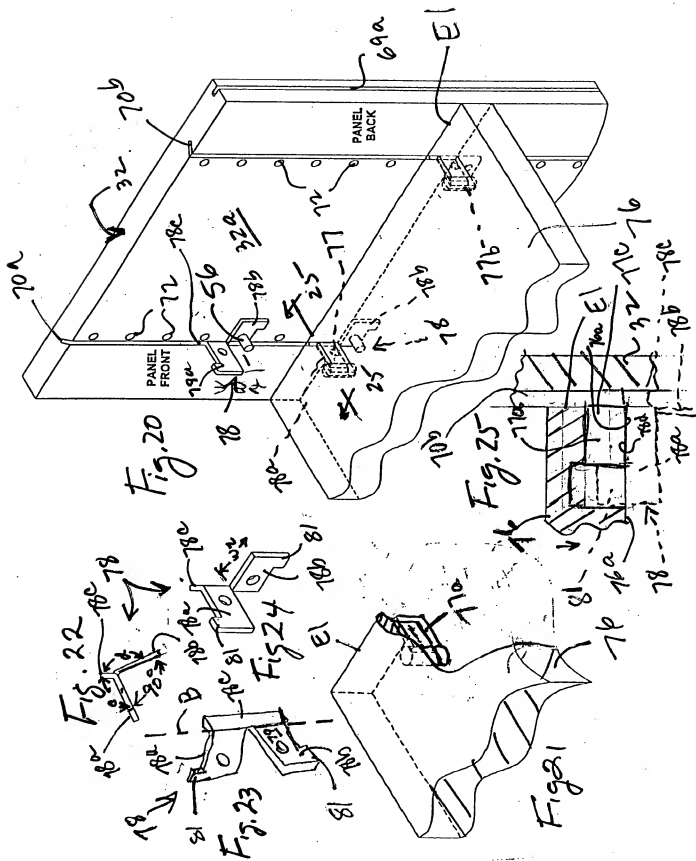




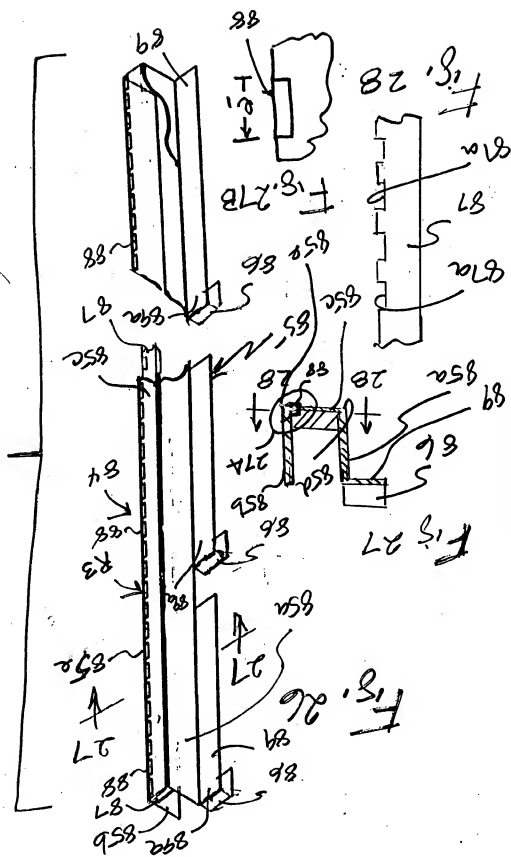








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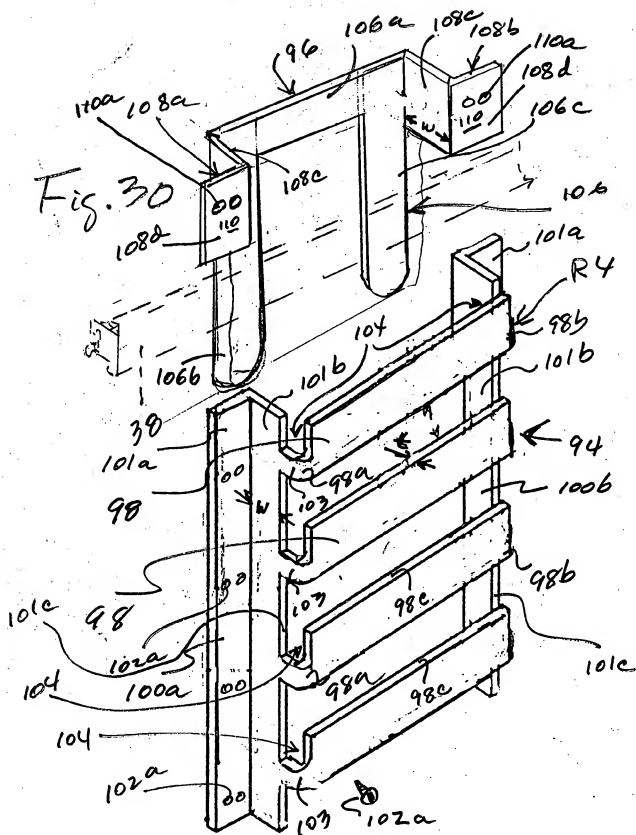
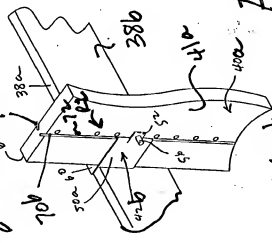




Fig. 16A<sup>9-10</sup>



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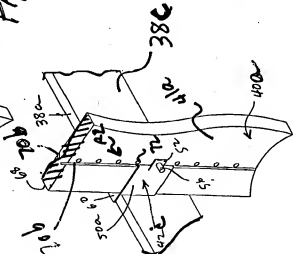


Fig. 31

